RF Breakout

• The benefits of solid state RF amplifiers compared to klystrons/tubes.
  • No high voltage and low phase ripple
  • Inherent modularity and redundancy in the design.

• Balance between modularity and production costs.
  • Suppliers reduce modularity to improve production cost, but is it worth it?
  • SOLEIL chose to maintain modularity, even at a slightly higher cost allowing them to begin replacing 7-year-old transistors with updated transistors with higher gain and efficiency. Cost benefit resolution on the new transistors is 3 years.
    • The transistor technology is improving rapidly, driven by telecom and space industry.
RF Breakout

• Cost/Watt estimate
  • 350-500 MHz @ 100 kW cost is about 4.5 €/Watt.
  • Cost/Watt increases as frequency increases and power decreases.

• Nuts and bolts
  • Redundancy and operation margin (10% on power) should reduce the need for hot swapping components.
  • Test stand, or spare could help eliminate the need.
  • Fully tunable power supplies can help optimization.
  • Failures are typically binary instead of slow degradation.
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• In house vs. suppliers
  • In house gives you experience and generates local knowledge
  • Suppliers could be depended on location.

• Future
  • Next 10 – 15 years CW with MW power needs will all be solid state.
    • Tube costs will increase as solid-state costs drops.
    • Klystron/tube high frequency and high pulsed power is still has benefits.
  • Many facilities are pursing solid state amplifier options.
RF Breakout

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